CLAIMS:

1-4. (cancelled)

5. (currently amended) A frame transmitting device that sends downlink frames to at least one base station, comprising:

a clock for generating a first reference clock timing incrementing at regular intervals;

a downlink frame generator for generating a downlink frame for transmission;

a frame number adder for assigning a frame number to ~~a~~ the downlink frame ~~to be transmitted~~, wherein ~~said~~ the frame number is determined based on ~~said~~ the first reference clock timing ~~prospectively~~ adjusted by a value equal to or larger than an expected transmission delay time which ~~is equal to or larger than a maximum transmission delay of the frame~~the downlink frame is expected to take to travel to the base station; and

a transmitter for transmitting the downlink frame to the base station, where the downlink frame begins to be processed upon identification of the frame number of the downlink frame by a regularly incrementing second reference clock timing used in the base station.

6. (currently amended) A frame receiving device that receives uplink frames from at least one base station, comprising:

a receiver for receiving from the base station ~~a~~ an uplink frame having a frame number and storing the received uplink frame in a memory, wherein the frame number is given at the base station with reference to a regularly incrementing second reference clock timing used in the base station;

a clock for generating a first reference clock timing incrementing at regular intervals ~~indicative of the frame number of a received frame to be extracted~~; and

a frame extraction ~~controller~~ unit for extracting from the memory ~~a~~ the received uplink frame ~~having a~~upon identification of the frame number of the uplink frame ~~identified based on~~by the first reference clock timing which is ~~retrospectively~~ adjusted by a value equal to or larger than an expected transmission delay time which ~~is equal to or~~

~~larger than a maximum transmission delay of the received frame~~the uplink frame is expected to take to arrive from the base station.

7. (currently amended) A frame transmitting device ~~comprising:~~

~~a clock generator for generating a first clock pulse used for providing a frame;~~

~~a frame number adder for assigning a frame number to a frame; and~~

~~a transmitter for transmitting to a receiver the frame having the frame number;~~

~~wherein the frame number is determined based on an expected delay time of the frame; and~~according to claim 5, wherein the expected transmission delay time ~~is equal to the sum of a maximum delay time estimated for the frame, and~~comprises an estimated ~~maximum~~ phase difference between the first and second reference clock timings~~first clock pulse and a second clock pulse being generated in the receiver~~.

8. (currently amended) A frame receiving device ~~comprising:~~

~~a clock generator for generating a second clock pulse used for receiving~~

~~a receiver for receiving from a transmitter a frame having a frame number; and~~

~~a frame synchronizer for executing a frame synchronization adjustment based on the frame number;~~

~~wherein the frame synchronizer executes the synchronization adjustment based on an expected delay time required for the frame to reach the frame synchronizer; and~~

according to claim 6, wherein the expected transmission delay time ~~is equal to the sum of a maximum delay time estimated for the frame, and~~comprises ~~an estimated maximum~~ a phase difference between ~~a first clock pulse being generated in the transmitter and the second clock pulse~~[[]]the first and second reference clock timings.

9-10. (cancelled)

11. (currently amended) A frame transmitting device ~~comprising:~~

~~a clock for generating a reference clock timing;~~

~~a frame number adder for assigning a frame number to a frame, wherein said frame number is determined based on said reference clock timing adjusted by an expected delay time which is equal to or larger than a maximum transmission delay of the frame; and~~

~~a transmitter for transmitting the frame to which said frame number is assigned;~~

~~according~~ according to claim 5, wherein the expected transmission delay time is updated when a real delay time exceeds the expected transmission delay time.

12. (currently amended) A frame receiving device ~~comprising:~~

~~a receiver for receiving a frame having a frame number;~~

~~a clock for generating a reference clock timing indicative of the frame number of a received frame to be extracted; and~~

~~a frame extraction controller for extracting a received frame having a frame number identified based on the reference clock timing which is retrospectively adjusted by an expected delay time which is equal to or larger than a maximum transmission delay of the received frame;~~

~~according~~ according to claim 6, wherein the expected transmission delay time is updated when a real delay time exceeds the expected transmission delay time.

13-39. (cancelled)

40. (previously presented) A communication system for synchronous communication between each of base stations and a switching center, which is performed on the basis of frames, wherein; each of said base stations comprises:

a frame number generator for generating a plurality of frame numbers each of which identifies each of frame periods;

an uplink frame generator for generating uplink frame by adding to a frame for transmission said frame number corresponding to start timing of the uplink frame as an uplink number; and

a transmitter for transmitting said uplink frame; and said switching center comprises:

a buffer for receiving and storing said uplink frame transmitted from said base stations; and

a frame extraction unit for determining timing of extraction of said uplink frame from said buffer, on the basis of an estimated delay of communication between said

base stations and said switching center and said frame number added to received uplink frame and extracting said uplink frame from said buffer at determined timing

41. (previously presented) A communication system for synchronous communication between each of base stations and a switching center performed on the basis of frame, wherein; each of said base stations comprises:

a first generator for generating a first base clock used for said base station;

a first frame number generator for generating a plurality of frame numbers each of which identifies each of frame periods;

an uplink frame generator for generating an uplink frame by adding to a frame for transmission said frame number corresponding to start timing of the uplink frame, as an uplink frame number; and

a transmitter for transmitting said uplink frame; and

said switching center comprises:

an second clock generator for generating a second base clock used for said switching center being synchronous with said first base clock;

a second frame number generator for generating, on the basis of said second base clock, a plurality of second frame numbers each of which identifies each frame period;

a buffer for receiving and storing said uplink frame transmitted from said base stations;

a correction unit for generating, on the basis of each estimated delay due to communication between each of said base stations and said switching center, a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said corrected frame number; and

a second frame extraction unit for extracting from said buffer said uplink frame having an uplink frame number which is same as said corrected frame number according to timing indicated by said offset information.

42. (previously presented) The communication system of claim 41, wherein said switching center comprises:

a storage for storing estimated delays each due to communication between each of said base stations and said switching center; and

a determination unit for obtaining, by referring to said storage, a maximum value of said expected delays on the basis of attributes of said base stations with which said switching center should communicate; and

said correction unit generates, on the basis of said maximum value, a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said corrected frame number.

43. (previously presented) A communication system for synchronous communication between each of base stations and a switching center performed on the basis of frame periods, wherein; each of said base stations comprises:

a first frame number generator for generating a plurality of frame numbers each of which identifies each of frame periods;

an uplink frame generator for generating a uplink frame by adding to a frame for transmission whose length is dependent on type of service;

said first frame number corresponding to start timing of said uplink frame as an uplink frame number; and

a transmitter for transmitting said uplink frame; and

said switching center comprises:

a buffer for receiving and storing said uplink frame transmitted from said base stations;

a frame extraction unit for obtaining an estimated delay due to communication between each of said base stations and said switching center according to type of service and attributes of the base station, determining timing of extraction of said uplink frame from said buffer, on the basis of said estimated delay and said frame number added to received uplink frame, and extracting said uplink frame from said buffer at determined timing.

44. (previously presented) A communication system for synchronous communication between each of base stations and a switching center performed on the basis of frame, wherein each of said base stations comprises:

a first generator for generating a first base clock used for said base station;

a first frame number generator for generating a plurality of frame numbers each of which identifies each of frame periods;

an uplink frame generator for generating an uplink frame by adding to a frame for transmission whose length is dependent on type of service said frame number corresponding to start timing of the uplink frame as an uplink frame number; and

a transmitter for transmitting said uplink frame; and

said switching center comprises:

a second clock generator for generating a second base being synchronous with said first clock;

a buffer for receiving and storing said uplink frame transmitted from said base stations;

a correction unit for generating, on the basis of an estimated delay due to communication between each of said base stations and said switching center, a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said corrected frame number; and

a second frame extraction unit for extracting from said buffer uplink frames having uplink a frame number which is same as said corrected frame number according to timing indicated by said offset information.

45. (previously presented) The communication system of claim 44, wherein said switching center comprises:

a storage for storing estimated delays each due to communication between each of said base stations and said switching center corresponding to types of service; and

a determination unit for obtaining, by referring to said storage, a maximum value of said expected delays on the basis of types of service and attributes of said base stations with which said switching center should communicate; and

said correction unit generates, on the basis of said maximum value, a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said corrected frame number.

46. (previously presented) The communication system of claim 44, wherein said switching center further comprises a delay detection unit for detecting a delay in reception of said uplink frame by comparing said second frame number with a received uplink frame number; and
when said delay detection unit detects a delay, said correction unit decreases said corrected frame number.

47. (previously presented) The communication system of claim 46, wherein when said delay detection unit detects a delay, said correction unit decreases said corrected frame number by an amount corresponding to a type of service.

48. (previously presented) The communication system of any one of claims 40, 41 and 43 wherein said uplink frame generator generates said uplink frame by adding information on reliability to the frame for transmission; and

said switching center further comprises a combining unit for combining said uplink frames extracted from said buffer, on the basis of said information on reliability each of which is added to each frame, to generate one uplink frame.

49. (cancelled)

50. (previously presented) A switching center provided for a frame communication system in which a plurality of base stations and said switching center carry out synchronous communication on the basis of frames comprising:

a clock generator for generating a base clock used for said switching center;

a frame number generator for generating, on the basis of said base clock, a plurality of frame numbers each of which identifies each frame period;

a buffer for receiving and storing said uplink frame transmitted from said base stations;

a correction unit for obtaining an estimated delay due to communication between each of said base stations and said switching center according to service and the base station, generating, on the basis of an estimated delay time due to communication

between each of said base stations and said switching center, a corrected frame number made by correcting said frame number and offset information on time difference from a beginning of the corrected frame number; and

a frame synchronizer for extracting from said buffer uplink a frame having an uplink frame number which is same as said corrected frame number according to timing indicated by said offset information.

51. (previously presented) A communication system in which each of base stations and a switching center carries out synchronous communication on the basis of frame periods, wherein said switching center comprises:

a first frame number generator for generating a plurality of first frame numbers each of which identifies each frame period;

a first buffer for receiving and storing frames for transmission;

a correction unit for generating, on the basis of an estimated delay due to communication between each of said base stations and said switching center, a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said frame period;

a first frame extraction unit for extracting from said first buffer said frame for transmission and adding said corrected frame number to an extracted frame for transmission as a downlink frame number, to generate a downlink frame; and

a transmitter for transmitting said downlink frame; and

each of said base stations comprises:

a second buffer for receiving and storing said downlink frame;

a second frame number generator for generating a plurality of second frame numbers each of which identifies each frame period; and

a second frame extraction unit for extracting from said second buffer a downlink frame having a downlink frame number which is same as said corrected frame number according to a start timing of the frame period.

52. (previously presented) The communication system of claim 51, wherein said switching center further comprises a first clock generator for generating a first base clock used for said switching center; and

said first frame number generator generates, on the basis of said first base clock, a plurality of first frame numbers each of which identifies each frame period; and

each of said base stations further comprises a second clock generator for generating a second base clock synchronous with said first base clock; and

said second frame number generator generates a plurality of first frame numbers each of which identifies each frame period on the basis of said first base clock.

53. (previously presented) The communication system of claim 51, wherein said switching center comprises:

a storage for storing estimated delays each due to communication between each of said base stations and said switching center corresponding to types of service; and

a determination unit for obtaining, by referring to said storage, a maximum value of said expected delays, on the basis of said plurality of base stations with which said switching center should communicate and types of service; and

said correction unit generates a corrected frame number made by correcting said second frame number and offset information on time difference from a beginning of said frame period.

54. (previously presented) The communication system of claim 53, wherein each of said base stations further comprises:

a control unit for comparing said second frame number with the received downlink frame number when detecting delay of reception of the downlink frame, to generate a request for correction of downlink frame number; and

a transmitter for transmitting said request to said switching center; and

upon receipt of said request, said correction unit increases said corrected frame number.

55. (previously presented) The communication system of claim 54, wherein upon receipt of said request, said correction unit increases said corrected frame number by an amount corresponding to said type of service.

56. (previously presented) The communication system of any one of claims 40, 41, 43, 44 and 51, wherein said estimated delay includes a maximum value of possible phase differences between said first and said second base clock.

57. (previously presented) The communication system of any one of claims 43, 44 and 53, further comprising a plurality of transmission channels, each of which connects each of said base stations and said switching center; and wherein each of said transmission channels divides said uplink frame into cells each having a fixed length to transmit, assembles divided cells to generate said uplink frame, and transmits the uplink frame.

58. (cancelled)

59. (previously presented) A switching center provided for a communication system, which carries out synchronous communication with a plurality of base stations on the basis of frame period comprising:

a clock generator for generating a base clock used for said switching center;

a frame number generator for generating a plurality of frame numbers each of which identifies each frame period on the basis of said base clock;

a buffer for receiving and storing frames for transmission;

a correction unit for obtaining, on the basis of a type of service and attributes of said base station, an estimated delay due to communication between the base station and said switching center, and generating a corrected frame number made by correcting said second frame number and offset information on time difference from a beginning of said frame period; and

a downlink frame generator for generating a downlink frame by extracting said frame for transmission from said buffer according to timing indicated by said offset information and adding said corrected frame number to said extracted frame as a downlink frame number.

60. (previously presented) A method for a communication in which each of base stations and a switching center carries out synchronous communication on the basis of frames comprising the steps of:

generating a plurality of frame numbers each of which identifies each of frame periods by said base station;

generating an uplink frame by adding said frame number corresponding to start timing of said uplink frame to a frame for transmission as an uplink frame number by said base station;

transmitting said uplink frame by said base station;

receiving said uplink frame by said switching center; and

adjusting synchronization of said uplink frame, on the basis of an estimated delay due to communication between said base station and said switching center and a frame number added to said received uplink frame by said switching center.

61. (previously presented) A method for a communication in which each of base stations and a switching center carries out synchronous communication on the basis of frames comprising the steps of:

generating a frame number to identify each of said frame periods by said base station;

generating an uplink frame by adding said frame number corresponding to start timing of an uplink frame to a frame for transmission as an uplink frame number by said base station;

transmitting said uplink frame by said base center;

receiving said uplink frame by said switching center;

obtaining an estimated delay due to communication between said base station and said switching center, on the basis of a type of service and attributes of said base station by a switching center; and

adjusting synchronization of said uplink frame on the basis of said estimated delay and said uplink frame number which is added to said received uplink frame by said switching center.

62. (previously presented) A method for a communication in which each of base stations and a switching center carries out synchronous communication on the basis of frames comprising the steps of:

said base station generating a first base clock used for the base station;

generating a plurality of first frame numbers each of which identifies each frame period on the basis of said first base clock;

generating an uplink frame by adding to frame for transmission said first frame number corresponding to start timing of said uplink frame as a uplink frame number; and

transmitting said uplink frame; and

said switching center generating a second base clock used for said switching center;

generating a second frame number to identify said frame period on the basis of said second frame clock;

obtaining an estimated delay due to communication between each of said base station and said switching center, on the basis of a type of service and attributes of the base station;

generating a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said frame period; and

extracting from said buffer an uplink frame having a same frame number as said corrected frame number at timing indicated by said offset information.

63. (previously presented) A method for a frame communication in which each of base stations and a switching center carries out synchronous communication on the basis of frames comprising the steps of:

said switching center generating a first frame number to identify each frame period;

receiving and storing into a first buffer frames for transmission;

generating a corrected frame number made by correcting said second frame number and offset information on time difference relative to a beginning of said frame

period, on the basis of an estimated delay due to communication between each of said base stations and said switching center; and

extracting from said first buffer said frame for transmission at timing indicated by said offset information;

generating a downlink frame by adding said corrected frame number to said extracted frame for transmission; and

transmitting said downlink frame; and

said base station receiving and storing into a second buffer said down link frame;

generating a plurality of second frame numbers each of which identifies each frame period;

extracting from said second buffer a downlink frame having a same number as said second frame number at start timing of said frame period.

64. (previously presented) A method for a frame communication in which each of base stations and a switching center carries out synchronous communication on the basis of frames comprising the steps of:

said switching center generating a plurality of first frame numbers each of which identifies each frame period;

receiving and storing into a first buffer frames for transmission;

storing estimated delays due to communication between each of said base stations and said switching center corresponding to types of service;

obtaining a maximum value of said estimated delays by referring to said first buffer, on the basis of types of communication and attributes of said base stations with which said switching center should communicate;

generating a corrected frame number made by correcting said first frame number and offset information on time difference relative to a beginning of each frame period on the basis of said maximum value;

extracting from said first buffer a frame for transmission at timing indicated by said offset information;

generating a downlink frame by adding said corrected frame number to said extracted frame for transmission as a downlink frame number;

transmitting said downlink number; and

each of said base stations receiving and storing to a second buffer said downlink frame;

generating a plurality of second frame numbers each of which identifies each frame period; and

extracting from said second buffer a downlink frame having a same downlink number as said second frame number at start of timing of said frame period.

65. (new) A method for transmitting downlink frames to at least one base station, comprising the steps of:

generating a first reference clock timing incrementing at regular intervals;

generating a downlink frame for transmission to the base station;

generating a frame number assigned to the downlink frame, wherein the frame number is determined based on the first reference clock timing adjusted by a value equal to or larger than an expected transmission delay time which the downlink frame is expected to take to travel to the base station; and

transmitting the downlink frame to the base station, where the downlink frame begins to be processed upon identification of the frame number of the downlink frame by a regularly incrementing second reference clock used in the base station.

66. (new) A method according to claim 65, wherein the expected transmission delay time comprises a phase difference between the first and second reference clock timings.

67. (new) A method according to claim 65, wherein the expected transmission delay time is updated when the expected transmission delay time is found deviated from an actual transmission delay time.

68. (new) A method according to claim 65, wherein each of the first and second reference clock timings increments recurringly.

69. (new) A method for receiving at a switching center frames of data from at least one base station, comprising the steps of:

generating a first reference clock timing incrementing at regular intervals;

receiving from the base station an uplink frame having a frame number which is given at the base station with reference to a regularly incrementing second reference clock timing used in the base station;

storing the received uplink frame in a memory; and

extracting the uplink frame from the memory upon identification of the frame number of the uplink frame by the first reference clock timing which is adjusted by a value equal to or larger than an expected transmission delay time which the uplink frame is expected to take to arrive from the base station.

70. (new) A method according to claim 69, wherein the expected transmission delay time comprises a phase difference between the first and second reference clock timings.

71. (new) A method according to claim 69, wherein the expected transmission delay time is updated when the expected transmission delay time is found deviated from an actual transmission delay time.

72. (new) A method according to claim 69, wherein each of the first and second reference clock timings increments recurringly.

73. (new) A transmitting device that sends same downlink frames to more than one base station, comprising:

a clock that generates a first reference clock timing incrementing at regular intervals;

a downlink frame generator that generates a downlink frame for transmission to the more than one base station;

a frame number generator that generates a frame number assigned to the downlink frame, wherein the frame number is determined with reference to the first reference clock timing adjusted by a value equal to or larger than the greater or greatest of expected transmission delay times which the downlink frame is expected to take to travel to the more than one base station; and

a transmitter that transmits the downlink frame to the more than one base station, where the downlink frame begins to be processed upon identification of the frame

number of the downlink frame by a regularly incrementing second reference clock timing used in the more than base station.

74. (new) A transmitting device according to claim 73, wherein the expected transmission delay time for a particular base station comprises a phase difference between the first reference clock timing and the second reference clock timing used in the particular base station.

75. (new) A transmitting device according to claim 73, wherein the expected transmission delay time for a particular base station is updated when the expected transmission delay time is found deviated from an actual transmission delay time for the particular base station.

76. (new) A transmitting device according to claim 73, wherein each of the first and second reference clock timings increments recurringly.

77. (new) A method for transmitting same downlink frames to more than one base station, comprising:

generating a first reference clock timing incrementing at regular intervals;

generating a downlink frame for transmission to the more than one base station;

generating a frame number assigned to the downlink frame, wherein the frame number is determined with reference to the first reference clock timing adjusted by a value equal to or larger than the greater or greatest of expected transmission delay times which the downlink frame is expected to take to travel to the more than one base station; and

transmitting the downlink frame to the more than one base station, where the downlink frame begins to be processed upon identification of the frame number of the downlink frame by a regularly incrementing second reference clock timing used in the more than base station.

78. (new) A method according to claim 77, wherein the expected transmission delay time for a particular base station comprises a phase difference between the first

reference clock timing and the second reference clock timing used in the particular base station.

79. (new) A method according to claim 77, wherein the expected transmission delay time for a particular base station is updated when the expected transmission delay time is found deviated from an actual transmission delay time for the particular base station.

80. (new) A method according to claim 77, wherein each of the first and second reference clock timings increments recurringly.

81. (new) A frame receiving device that receives same uplink frames from more than one base station, comprising:

a clock that generates a first reference clock timing incrementing at regular intervals;

a receiver that receives from each base station an uplink frame having a frame number and stores the received uplink frames in a memory, wherein the frame number is given at each base station with reference to a regularly incrementing second reference clock timing used in each base station; and

a frame extraction unit that extracts the received uplink frames from the memory upon identification of the frame number of each received uplink frame by the first reference clock timing which is adjusted by a value equal to or larger than the greater or greatest of expected transmission delay times which the uplink frames are expected to take to arrive from the more than one base station.

82. (new) A frame receiving device according to claim 81, wherein the expected transmission delay time for a particular base station comprises a phase difference between the first reference clock timing and the second reference clock timing used in the particular base station.

83. (new) A frame receiving device according to claim 81, wherein the expected transmission delay time for a particular base station is updated when the expected transmission delay time is found deviated from an actual transmission delay time for the particular base station.

84. (new) A frame receiving device according to claim 81, wherein each of the first and second reference clock timings increments recurringly.

85. (new) A method for receiving same uplink frames from more than one base station, comprising the steps of:

generating a first reference clock timing incrementing at regular intervals;

receiving from each base station an uplink frame having a frame number, wherein the frame number is given at each base station with reference to a regularly incrementing second reference clock timing used in each base station;

storing the received uplink frames in a memory; and

extracting the received uplink frames from the memory upon identification of the frame number of each received uplink frame by the first reference clock timing which is adjusted by a value equal to or larger than the greater or greatest of expected transmission delay times which the uplink frames are expected to take to arrive from the more than one base station.

86. (new) A method according to claim 86, wherein the expected transmission delay time for a particular base station comprises a phase difference between the first reference clock timing and the second reference clock timing used in the particular base station.

87. (new) A method according to claim 86, wherein the expected transmission delay time for a particular base station is updated when the expected transmission delay time is found deviated from an actual transmission delay time for the particular base station.

88. (new) A method according to claim 86, wherein each of the first and second reference clock timings increments recurringly.